REMARKS

Claims 1-46 are pending in the present Application. Claims 1-36 have been withdrawn, claims 1, 13, 25, 37-39, 41-43, and 46 have been amended, and claims 4, 18, 30, and 40 has been cancelled, leaving claims 37-39 and 41-46 for consideration upon entry of the present Amendment.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Amendments

Withdrawn claims 1, 13, and 25 have been amended to incorporate the limitations of claims 4, 18, and 30, respectively.

Support for a temperature of "about or above about 800°C" in amended claim 38 can be found at least in paragraph 31.

Claim 38 has been amended to depend from claim 37 and to correct antecedent basis. The claim now includes the language from the specification regarding heat treated dried sol retaining nanostructure character (paragraph 31, last sentence).

Dependent claims 39 and 41-42 are amended to depend from independent claim 37.

Dependent claims 43 and 46 were amended to depend from claim 37.

No new matter has been introduced by these amendments.

Claim Rejections Under 35 U.S.C. § 102(b) and § 102(e)

Claims 37-39, 41, and 42 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by US 5580655 to El-Shall et al ("El-Shall"). Applicants respectfully traverse this rejection.

El-Shall teaches silica nanoparticles produced by laser vaporization of silicon metal in a helium/oxygen atmosphere, where the particles have a "three-dimensional web structure of fused together silica nanoparticles of a diameter of between 5-50 nanometers" (claim 1) which are characterized as "new photoluminescent web-like nanoparticle silica" (column 2, lines 40-42). Further, El-Shall teaches a method of performing infrared surface analysis on the silica nanoparticles. Prior to the analysis, the silica nanoparticles are activated to remove physisorbed species, including water, by heating powdered pellets at 600°C under dynamic vacuum for two hours (column 3, lines 14 -22). This is the only mention of a heating step performed on silica nanoparticles in El-Shall.

First, El-Shall teaches a "three-dimensional web structure of fused together silica nanoparticles," not a chain structure as recited in the instant claims. The reference to "interchain spacing" refers to the distance between chains in the three-dimensional structure.

> The nanoparticle silica is a three dimensional web-like microstructure in a porous arrangement of aggregates with an interchain spacing and superstructure in the pattern of alternating areas of particles and holes.

(Col. 6, ll. 12-15). There is no disclosure of chain length because the "chains" referred to in El-Shall are simply the structures that define the alternating areas of particles and holes. Heat treatment in El-Shall is thus of a completely different type of physical structure – a three dimensional web, rather than chains having a length of about 5 to bout 400 nanometers.

Secondly, there is no teaching that the heat treatment in El-Shall produces crystalline structure, and similarity of conditions does not render this limitation inherent. The heating step in El-Shall starts with a completely different type of silica. It is formed by laser vaporization, and has a very different morphology. There is no evidence that a crystal phase would form after heat treatment.

El-Shall does not teach or disclose heating silica particles to obtain at least one crystalline phase, or heating a dried amorphous silica sol to 800°C. Because the El-Shall silica nanoparticles are formed by an unconventional method (laser vaporization), formation of a crystalline phase in the three-dimensional web structure at 600°C cannot be presumed to be inherent to the El-Shall particles, any more than a bright blue photoluminescence can be presumed inherent to Applicants' silica particles. For at least this reason, El-Shall does not anticipate or render obvious Applicants' claims. Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 37-39, and 41-43 stand rejected under 35 U.S.C. § 102(e), as allegedly anticipated by US 6387981 to Zhang et al ("Zhang"). Applicants respectfully traverse this rejection.

Zhang teaches colloidal (column 5, line 34-52) and fumed silicas (column 5, line 64) for use in a dental filler. The preferred commercial colloidal and fumed silicas cited by Zhang (column 5, lines 58-62) and sold by Nalco, Degussa, and Cabot, however, are each amorphous, whether they comprise discrete particles, agglomerates, or chains. In other words, Zhang discloses materials that can only be compared to Applicants' starting materials of claim 37. There is no teaching or disclosure by Zhang of silica nanoparticles in the form of chains having "at least one crystalline phase," or teaching or disclosure of heating a dried amorphous silica sol to form at least one crystalline phase The Zhang amorphous colloidal or fumed silicas are therefore not the same as the heated dried silica sol having at least one crystalline phase, a product of the process in claim 37. Zhang also does not teach or disclose surface treating a heated dried silica sol having at least one crystalline phase with a silane. Therefore Zhang does not anticipate the claims. Reconsideration and withdrawal of this rejection is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 37-39, and 43 stand rejected under 35 U.S.C. § 103(a), as allegedly obvious over US 6387981 to Zhang ("Zhang") in view of US 6193792 to Fague ("Fague"). Applicants respectfully traverse this rejection.

Zhang is discussed above.

Fague teaches "fumed" silica particles which are prepared by burning silicon-containing compounds and which consist of particles bonded together in beads or chains as opposed to "precipitated colloidal silica" which are "small particles of SiO_2 dispersed in liquid" (column 7, lines 38-50). As noted above, fumed silica, whether it contains beads or chains, is amorphous. For example, CAB-O-SIL® untreated fumed silica by Cabot Corporation cited by Zhang is advertised as amorphous. Cabot Corporation discloses their fumed silica is prepared by high temperature hydrolysis of chlorosilanes in a hydrogen/oxygen flame.

Applicants' starting materials for the process of claim 37 are various grades of SNOWTEX™-PS (paragraph 31, bottom), which though they contain chains of particles, are not "fumed" silica. According to the Nissan Chemical technical disclosure, the SNOWTEX™-PS materials are derived from monodisperse amorphous colloidal silica nanoparticles. An undisclosed process produces the "string of pearl" chains without causing the formation of at least one crystalline phase. Applicants confirm that the SNOWTEX™-PS starting material is amorphous (Example 8). Zhang in view of Fague therefore does not disclose or teach either Applicants' amorphous silica sol starting material or Applicants' heated dried silica sol having at least one crystalline phase as specified by claim 37. Zhang in view of Fague also does not teach heating an amorphous dried silica sol at 800°C, or surface treating the heated dried silica sol having at least one crystalline phase with a silane. Therefore Zhang in view of Fague does not render the claims obvious. Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 44-46 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Zhang (US 6387981) as applied to claim 38 above, and further in view of US 4180911 to Bullock ("Bullock"). Applicants respectfully traverse this rejection.

Bullock teaches silane treated silica powder for dental fillers, but does not disclose silica powders comprising at least one crystalline phase. Zhang was discussed above.

Amended claim 38 now includes the limitations of claim 37. Dependent claims 43-46 include the limitations of claim 37. Accordingly, Zhang in view of Bullock also does not disclose or teach either Applicants' amorphous silica starting material or Applicants' heated dried silica sol having at least one crystalline phase as specified by claim 37. Zhang in view of Bullock also does not teach heating an amorphous dried silica sol. Zhang in view of Bullock also does not teach surface treating a heated dried silica sol with a silane wherein the heated dried silica sol has at least one crystalline phase. Therefore Zhang in view of Bullock also does not render the claims obvious. Reconsideration and withdrawal of this rejection is respectfully requested.

Provisional Nonstatutory Double Patenting over Claims of Copending Patent No. 6,417,246

Claims 37-39 stand rejected on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over Claims 1-12 of U.S. Patent No. 6,417,246 to Jia et al. ("Jia"). Applicants respectfully traverse this rejection.

Jia discloses dental filler compositions based on the SNOWTEX™-PS materials (column 3, lines 40-60). These are the same as Applicants' starting materials of claim 37 as discussed above. Jia uses the amorphous SNOWTEX™-PS materials directly or surface treats the amorphous SNOWTEX™-PS material with a silane (column 3, lines 55-60) to produce the filler compositions of Jia claims 1-12. The filler compositions of Jia claims 1-12 are therefore not the same as Applicants filler composition produced by the method of claim 37.

Jia does not teach or disclose Applicants' heated dried silica sol having at least one crystalline phase, or heating a dried silica sol to produce at least one crystalline phase, or surface treating a heated dried silica sol having at least one crystalline phase with a silane. Reconsideration and withdrawal of the rejection is requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejection(s) and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

By___/Leah M. Reimer/_____
Leah M. Reimer
Registration No. 39,341

Michael R. Roberts
Registration No. 59,395

Date: January 31, 2008
CANTOR COLBURN LLP
20 Church Street
22nd floor
Hartford, CT 06103-3207
Telephone: (860) 286-2929
Facsimile: (860) 286-0115
Customer No.: 23413